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SPECIFICATIONS

1. Title of the Invention

Method of Controlling Incoming Calls

2. Claims

- (1) A method of controlling incoming calls in an exchange system which is provided with an incoming call forwarding service, and wherein a means for recording information for a plurality of incoming call destinations or forwarding destinations for each telephone terminal, and a means for recording control information for the initiation and termination of the execution of call reception or call forwarding to such incoming call destinations or forwarding destinations are provided, and wherein incoming calls and call forwarding are controlled for each telephone terminal according to such recorded information.

(2) A method of controlling incoming calls as described in Paragraph 1 of these Claims, wherein the control of the initiation and termination of call reception or call forwarding is executed by reference to specified external conditions and control information.

(3) A method of controlling incoming calls as described in Paragraph 1 of these Claims, wherein such control information is provided as time information.

3. Detailed Description of the Invention

Purpose of the invention

Applicable area of industry

This invention relates to a method of controlling incoming calls which is able to efficiently control incoming calls to telephone terminals and the forwarding of incoming calls.

Prior art

Over recent years, the services provided by exchange systems have been expanded, and call forwarding services such as called party absent call forwarding and so forth are in wide use. Such call forwarding services register call forwarding destination telephone numbers for individual telephone terminals, and when a call in the form of an incoming call or an attempt to make an incoming call is generated for the telephone terminal, the call is automatically forwarded to the aforementioned call forwarding destination. The use of such telephone call forwarding service functions enables for example the forwarding of calls to external destinations, and have the effect of providing assured telephone connections for urgent calls and so forth.

However, such call forwarding is executed for one pre-set forwarding destination only. Moreover, modification to the call forwarding destination or release of call forwarding must be made by input of an appropriate instruction from the relevant telephone terminal. This gives rise to the following inconveniences.

When the daily travel patterns of human beings are considered, as shown in Figure 4 for example, the user of telephone terminal A may have occasion to travel a plurality of external destinations B, C and D. Thus, when an incoming call is made to telephone terminal A, or an attempt is made to call in to telephone terminal A, the user may wish to forward such call to external destinations B, C or D.

However, as noted in the foregoing, only one of such forwarding destinations may be registered, and such forwarding destination may be modified from telephone terminal A only. Hence, in order to provide call forwarding to the aforementioned plurality of external destinations, the modifications to the call forwarding destinations must be made from telephone terminal A, for example by means of (illegible) on each occasion. Moreover, the procedures to modify such call forwarding destinations, and to release the call forwarding, must be performed frequently, and are very onerous.

Deficiencies addressed by the present invention

Thus, under the prior art, only one call forwarding destination could be set, and the procedures in order to modify such call forwarding destination and to release call forwarding had to be performed from the relevant telephone terminal on each occasion, but these necessities should be obviated in order to provide effective utilization of the telephone call forwarding service functions.

The present invention takes account of this situation, and it is an objective of the present invention to provide a method of controlling incoming calls which enables the simple, efficient and automatic modification of a plurality of call forwarding destinations and release of such call forwarding, and the further improvement of telephone call forwarding services.

Constitution of the present invention

Means employed in order to overcome such deficiencies

The present invention provides a method of controlling incoming calls in an exchange system which is provided with an incoming call forwarding service, and wherein a means for recording information for a plurality of incoming call destinations or forwarding destinations for each telephone terminal, and a means for recording control information for the initiation and termination of the execution of call reception or call forwarding to such incoming call destinations or forwarding destinations are provided, and when an incoming call arrives at such telephone terminal or an attempt is made to call in to such telephone terminal, external conditions such as for example time information and the aforementioned control information are referenced, and according to the results of such reference, either the call in destination or alternatively the call forward destination is specified, and incoming calls to, and call forwarding from, the aforementioned telephone terminal are controlled.

Action

Under the present invention, information relating to a plurality of incoming call destinations and/or a plurality of call forwarding destinations, and control information relating to the commencement and/or termination of the execution of incoming calls or call forwarding to such plurality of incoming call destinations and/or plurality of call forwarding destinations is registered, whereby for example by referencing the individual schedule of the user of the telephone terminal and the said control information, when incoming calls are made to the telephone terminal or attempts are made to call in to the telephone terminal, the incoming call destination or alternatively the call forwarding destination may readily be specified.

Consequently, the call forwarding destination may be successively modified according to external conditions such as for example time information and so forth with the passage of time, and call forwarding may be released, and call forwarding may be re-set.

Consequently, the burden of performing the procedures to modify the call forwarding destination and releasing the call forwarding service from the telephone terminal on each occasion is removed, and the (desirable effect?) of the performance of such processing automatically according to external conditions such as elapsed time and so forth is achieved.

Practical embodiment

The following is a description of a practical embodiment of the invention by means of reference to the diagrams.

Figure 1 is an outline schematic diagram of an exchange system so formed as to apply the method of the practical embodiment.

A plurality of telephone terminals 3a to 3n is connected through the respective subscriber lines 2a to 2n to the switching device 1, and local lines are connected through the trunk lines 4a to 4m. The switching device 1 controls the connections of the lines through the central controller 5 which is known as the CC. The central controller 5 performs call processing and service processing according to the different types of information and the control programs which are stored in the memory member 6. One of the service processes performed by the central controller 5 is the call forwarding service.

It is a characteristic of such exchange system that, when incoming calls are made, and/or attempts are made to call in, to the aforementioned telephone terminals 3a to 3n, such incoming

calls or attempts to call in are controlled according to the call forwarding service information that is recorded in the memory medium 6.

Figure 2 shows an outline of aforementioned central controller 5 and memory medium 6 which control the incoming calls and call forwarding, and these consist essentially of the control unit 11, the call processing unit 12, the incoming call and call forwarding destination information storage device 13, the location information storage device 14, the reference data storage device 15, and the reference unit 16. In the diagram, 17 is an external system which is connected to the exchange system and which manages the locations and schedules of telephone terminal users and manages security and so forth.

The location information storage device 14 records information on the telephone terminals 3a to 3n that are closest to the location at which the telephone user is present, and provides such information to the control unit 11. The input of such user location information into the location information storage device 14 and the modification of such information, may be made with for example the following data:

- ① Data based on information on the locations and schedules of individuals which is provided by related external systems
- ② Data based on information on the forwarding destinations of individual destinations that are recorded in the incoming call and call forwarding destination information storage device 13
- ③ Location data entered in real time by users from the telephone terminals 3a to 3n

It is desirable that parameters that indicate for example input times, probabilities and so forth for such data should be added, and that priority sequences should be applied according to such parameters in order to prevent clashes caused by inconsistent data.

From time to time, the incoming call and call forwarding settings for individual users may be set or modified, and control information for the starting times and ending times for the execution of incoming call and call forwarding services for such incoming calls and call forwarding destinations may be recorded in the incoming call and call forwarding destination information storage device 13. Then when calls are made to individual users, the correct incoming call destinations or alternatively call forwarding destinations are supplied to the aforementioned control unit 11.

The setting and modification of data in the incoming call and call forwarding destination information storage device 13 may be made by the users themselves from the nearest telephone

terminal 3a to 3n, or alternatively may be made by a representative of the users who makes a batch entry of such information. Then the information that is set in the incoming call and call forwarding destination information storage device 13 is analyzed for the aforementioned user locations and schedules, and is supplied as required to the relevant external system 17 or the
5 aforementioned location information storage device 14 and so forth.

When data is set in the incoming call and call forwarding destination information storage device 13, the periods of time during which the service is suspended (time slots during which incoming call and call forwarding services are not provided) may be determined, in order to facilitate
10 incoming calls from telephone terminals external to the system. As a result, even while services are being executed, the aforementioned periods of suspension may be employed, and processing procedures such as the modification or deletion of data may readily be performed as required.

The aforementioned reference data storage device 15 provides the following functions. The
15 device records whether or not incoming call and/or call forwarding services have been specified in the system for telephone terminals 3a to 3n, and advises the aforementioned control unit 11 whether or not to provide the aforementioned incoming call and/or call forwarding services for calls to the telephone terminals 3a to 3n.

A further function of the reference data storage device 15 is to determine from the single or
20 plurality of possible incoming call destinations (call forwarding destinations) specified by the user the appropriate incoming call destination, and to advise the control unit 11 of this. Such determination of the incoming call destination is made on for example conditions (control and rule data) for the user, possible incoming call destinations, and source of the incoming call
25 (calling party) and by a comparison of the priority sequences for possible incoming call destinations, and so forth.

Moreover maps in relation to user individual numbers (IDs) and the telephone numbers of the
30 telephone terminals 3a to 3n may be formed in the reference data storage device 15. By means of such maps, user individual telephone numbers and telephone numbers of the telephone terminals 3a to 3n may be found in order to determine the location of parties being called.

The data in the maps in the reference data storage device 15 may be managed by assigning
35 security numbers in order to prevent the unauthorized use or modification of such data.

Data required for the modification of the aforementioned information relating to incoming call destinations and call forwarding destinations and information on the locations of individuals,

such as for example dates and times, customer names, natural conditions, social conditions and so forth, is input into the reference unit 16, and such input data is supplied to the storage devices 13, 14 and 15. Thus the control unit 11 controls the call processing unit 12 according to the information that is stored in the storage devices 13, 14 and 15, and directs incoming calls to the telephone terminal 3a to 3n desired by the user, or to the appropriate telephone terminal 3a to 3n according to the conditions at the time, or forwards the call.

Thus if an outgoing call is made to a user terminal (telephone terminal 3a to 3n) in such an exchange system, the exchange system first determines whether or not incoming call and call forwarding services have been specified for that terminal. If incoming call and call forwarding services have been specified for the terminal, such service is initiated.

First, the incoming call and call forward service picks up from the aforementioned incoming call and call forwarding destination information storage device 13 the possible incoming call destinations or call forward destinations that have been specified for that user terminal. Next, for each of such possible destinations, the source of the incoming call, the user terminal, the (illegible) of the possible destination, restrictions, rule data, the priorities between possible destinations, and information relating to the location of the user, are examined. This information is obtained from the aforementioned location information storage device 14 and the aforementioned reference data storage device 15.

The control unit 11 makes (overall?) decisions concerning the information determined in this manner and determines the incoming call destination for the aforementioned call.

However, when for example a person or a group is designated as the incoming call destination, the telephone number of the telephone terminal 3a to 3n for the incoming call destination is determined according to the location information from the reference data storage device 15. Such telephone number is supplied to the call processing unit 12 whereby the call is delivered as an incoming call or is forwarded.

If the call to the incoming call destination or call forwarding destination which has been selected in this manner is not answered after a specified interval of time, the call may for example be transferred to the next possible incoming call destination.

As in the Japanese text - misprint for 'incoming call'? - Translator

Translation by Asia Technical Translation Pty Ltd

Consequently, under the present system, if for example the user of telephone terminal A as shown in the aforementioned Figure 4 has gone out and is travelling between external destinations B, C and D, and returns to the original location, calls to the aforementioned user may for example be controlled as incoming calls or calls to be forwarded as shown in Figure 3.

Thus, in this case, if the pattern of movements of the user of telephone terminal A is as shown in Figure 3 (a), this is specified as schedule information (and so forth?). Then such schedule information and time information are successively compared, and the incoming call destination and call forward destination are modified and set according to such conditions, whereby calls are automatically modified to incoming call destinations as shown in Figure 3 (b) or (c).

In Figure 3, (N) indicates no call forwarding, and (F-B), (F-C) and (F-D) indicate the forwarding of the call to the telephone terminals indicated by B, C and D. Moreover, symbols circled with a ring (○) indicate the modification of the incoming call destination and call forward destination, and the timing thereof.

In the exchange system which employs the method envisaged by the present invention and which is illustrated as an example in Figure 3, information for a plurality of incoming call destinations and call forward destinations is registered, and the control information which controls the initiation and termination of the execution of incoming call or call forwarding services is registered as for example individual schedules and so forth, whereby the incoming call destinations and/or call forward destinations for calls are automatically updated (selected) according to external conditions such as for example time and so forth and according to the aforementioned schedule information.

As a result, the burdensome operations of modifying call forwarding destinations, and releasing call forwarding, performed from specified telephone terminals on every occasion that they are required, as in the prior art, are not required. Moreover, the optimum incoming call destination or call forward destination is always selected simply by means of the modification of the schedule information and so forth, with the effect that conversations may readily be conducted with the desired parties.

The generality of the present invention is not restricted by the practical embodiment described in the foregoing. For example, when the recorded data is updated, the security of the system may be ensured by confirmation of the person performing such updating. Moreover, when information is updated in violation of security, a message to that effect may be passed to an external system.

Moreover, the aforementioned incoming call and incoming call forwarding services may be supplied both to individuals and to the groups to which individuals belong. Moreover, the determination of the incoming call destination and/or the incoming call forwarding destination may of course be made according to other external conditions. In essence, the present invention may be modified and implemented in various ways, provided only that the spirit of the invention is not violated.

Effects of the present invention

By means of the present invention as described in the foregoing, the incoming call destinations and/or call forwarding destinations of calls may be automatically modified according to time conditions or other external conditions, and the aforementioned calls may be directed or redirected to appropriate incoming call destinations or call forward destinations. Moreover, the present invention provides many benefits in that for example it does not impose the burden as in the prior art of requiring that the call forward destination be modified from a specific telephone terminal on each occasion.

4. Simplified Description of the Diagrams

Figure 1 is a schematic diagram of an exchange system so constituted as to apply a practical embodiment of the method envisaged by the present invention; Figure 2 is a diagram which illustrates the constitution of the main elements of the central device and the memory device which implement the method envisaged by the present invention; Figure 3 is a diagram to illustrate the action of the method of the present invention, and Figure 4 is a diagram which illustrates the movements of a user of a telephone terminal.

1 ... Switching device, 2a to 2n ... Subscriber lines, 3a to 3n ... Telephone terminals, 4a to 4m ... Trunk lines, 5 ... Central device (CC), 6 ... Memory member, 11 ... Controller, 12 ... Call processing unit, 13 ... Incoming call and call forwarding destination information storage device, 14 ... Location information storage device, 15 ... Reference data storage device, 16 ... Reference unit, 17 ... External system

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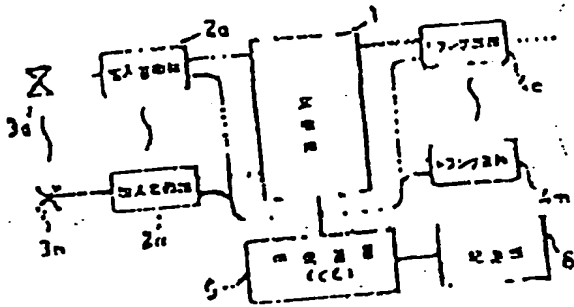


Figure 1

2a, 2n ... Subscriber lines, 3a, 3n ... Telephone terminals, 4a, 4n ... Trunk lines, 5 ... Control device (CC), 6 ... Memory member

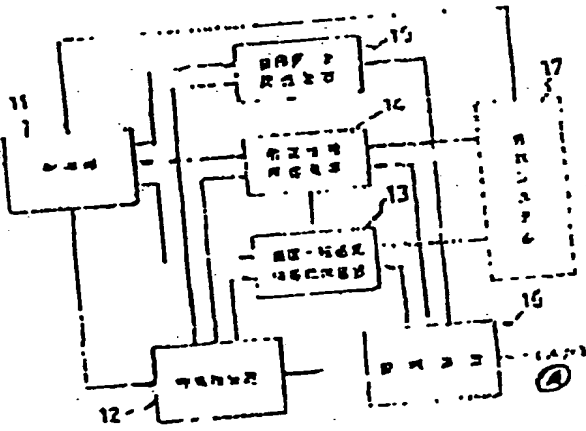


Figure 2

12 ... Call processing unit, 13 ... Incoming call and call forwarding destination storage device, 14 ... Location information storage device, 15 ... Reference data unit, 16 ... Reference unit, 17 ... External system, A: Input

Central
Controller